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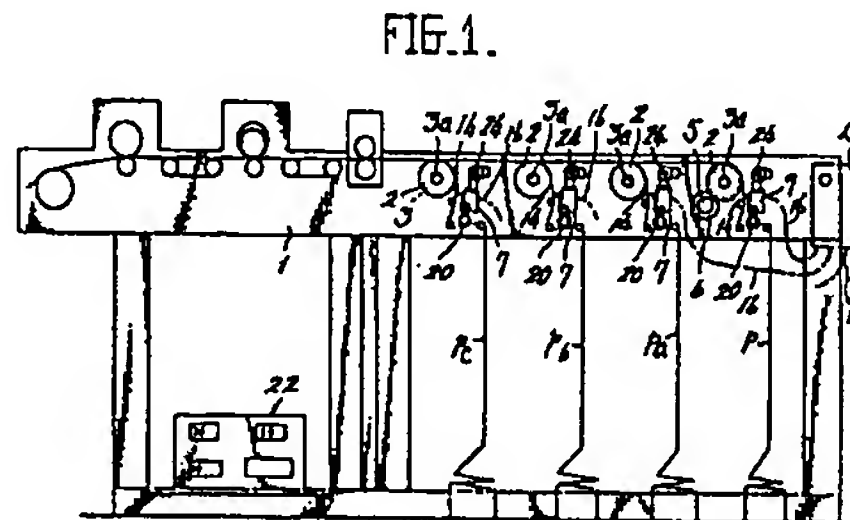
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**(54) Gluing apparatus for use with a form collator.**

(57) Gluing apparatus for use with a form collator for collating continuous sheets of paper (P;Pa;Pb;Pc). The collator has a framework 1, a plurality of rollers (3) extending transversely of the framework (1), each roller (3) being driven by a main motor and having a pin wheel (2) for advancing a continuous sheet of paper (P;Pa;Pb;Pc) hung over the roller (3). The gluing apparatus is positioned opposite each sheet of paper (P;Pa;Pb;Pc) and comprises a gear pump (7) having an inlet (12) connected to a glue reservoir (15) through a hose (16) and an outlet (11) provided with a nozzle (14) for applying glue to the paper. The gear pump (7) is driven by a motor (20) to skipingly or linearly apply glue according to input data of a programmable computer (22) responsive to pulse signals received from an encoder (5) arranged to sense advancing movement of the paper (P). In another embodiment (Figure 4), mechanical means such as a cam (131) is provided to swing the gear pump (107) towards and away from the paper (P).



## Description

## GLUING APPARATUS FOR USE WITH A FORM COLLATOR

This invention relates to gluing apparatus for use with a form collator and the like. In particular, the invention relates to a gluing apparatus for performing a gluing operation in a form collator, etc. by a motor drive and an electronic control of a computer or mechanical means of a cam, etc.

Heretofore, there has been used in general a gluing apparatus in which a continuous slip is hung over a plurality of pin wheels arranged in a framework, the pin wheels are driven by a motor to transfer the continuous slip, and in the meantime, a rotary plate dipped in a glue reservoir is turned in order to apply glue thereto and is contacted with the advancing continuous slip for applying the glue thereto.

However, in the conventional gluing apparatus with the rotary plate, it is almost impossible to perform a skip gluing or a spot gluing and, if not impossible, it becomes mechanically complicated.

Further, since glue is easily hardened when it contacts air, the rotary plate becomes coated with hardened glue and, when the gluing work is continued for a long time, the hardened glue portion spreads. Therefore, it is required to remove this hardened glue portion and this is inconvenient.

Furthermore, since the upper portion of the glue reservoir is open, the glue contained in the reservoir is easily mixed with dust, etc. and, therefore, must be replaced with fresh glue each time the gluing work is finished. This is naturally a waste of glue.

There has also been used another gluing apparatus in which a gear pump is provided and glue in a glue reservoir is transferred by the gear pump through a hose to a nozzle located opposite each slip at a remote position.

In the conventional gluing apparatus with the nozzle mounted on the foremost end of the hose and the gear pump disposed in the vicinity of the glue reservoir at a remote position, the glue remaining in the hose when the gear pump is stopped often comes out owing to inner pressure inside the hose and makes the slip dirty.

The present invention as claimed is intended to remedy at least some of the above-mentioned disadvantages of the known gluing apparatus.

It is therefore a first object of the present invention to provide gluing apparatus for use with a form collator and the like which is simple in structure, in which the working efficiency is improved, in which the glue can be always applied uniformly, and a linear gluing, spot gluing or a skip gluing can be selectively made, thereby to improve the quality of a product and to enhance the gluing work.

In order to achieve the first object, there is essentially provided in or for a form collator, gluing apparatus for applying glue to a continuous sheet of paper, the gluing apparatus comprising a gear pump having an inlet connected to a glue reservoir and an outlet provided with a nozzle opposite the continuous sheet of paper.

Preferably, the gear pump is driven by a motor under the control of a programmable control means, for example a computer, responsive to an encoder for detecting the continuous sheet of paper.

A second object of the present invention is to provide gluing apparatus for use with a form collator and the like in which the gluing operation is mechanically performed to apply the glue according to demand and, when the gluing operation is stopped, the glue is prevented from coming out of the hose so as not to dirty the slip and to avoid the loss of the glue.

These and other objects and advantages of the invention will be apparent from the following description of exemplary embodiments of the invented gluing apparatus given with reference to the accompanying drawings wherein:-

FIGURE 1 is a vertical sectional view of a collator incorporating a first embodiment of the invented gluing apparatus;

FIGURE 2 is a partly enlarged view of Figure 1;

FIGURE 3 is a sectional view taken along line III-III of Figure 2; and

FIGURE 4 is an enlarged view of part of the collator incorporating a second embodiment of the invented gluing apparatus.

In Figures 1 to 3, reference numeral 1 denotes a framework of a collator. The framework 1 is provided with a plurality of transversely extending rollers 3 spaced apart lengthwise of the framework and each having a pin wheel 2. Roller shafts 3a are rotated by a main motor and one of the roller shafts 3a is provided with a gear 4 meshed with a gear 6 of an encoder 5. A sheet of continuous paper P, Pa, Pb, Pc guided by guide rollers and having pin holes and perforations arranged in the advancing direction at predetermined pitches is hung over each pin wheel 2 and roller 3 and meshes with the pins of the wheel 2.

A gear pump body 7 is located opposite each of the continuous sheets of paper P, Pa, Pb and Pc. Each gear pump body 7 is formed therein with a continuous chamber 10 containing a pair of meshed gears 8 and 9 acting as a rotor and provided with an outlet port 11 and an inlet port 12.

The meshed gears 8 and 9 are rotably supported by shafts 8a and 9a within the chamber 10 for pumping. The shaft 8a is provided at the outer side of the body 7 with a gear 13 for driving.

The body 7 is provided with a nozzle 14 communicating with the outlet port 11, and the inlet port 12 is connected with a hose 16 from a glue reservoir 15.

The main body 7 is supported by an operating arm 18 as described later herein and is provided at its lower portion with a forward extension 7a in the direction of the nozzle 14.

The extension 7a is provided at its lower surface with a cut-away groove 7b for engaging with a rotary shaft 17 disposed in the transverse direction of the framework 1.

The rotary shaft 17 is provided with a gear 19 for

meshing with the gear 13 on the shaft 8a and a gear 21 for meshing with a gear 20a on a servo motor 20 as described later herein.

The encoder 5 detects the advancing movement of the continuous sheet of paper P as a desired pulse amount and the detected pulse amount is counted by a program counter located within a computer 22 thereby to activate the servo motor 20 at a predetermined position. By this, a skip gluing and a spot gluing can be effected.

The servo motor 20 carries out the gluing by driving the gear pump body 7. In order to effect the skip gluing or the spot gluing, the servo motor 20 is stopped for a predetermined interval so as not apply the glue onto the continuous sheet of paper. However, since the foregoing arrangement is insufficient to completely stop the discharge of the glue under extra pressure within the gear pump, a reverse rotation is given to the servo motor 20. The computer 22 is programmed such that, after the reverse rotation, a desired amount of normal rotation is effected in order to facilitate the discharge of glue.

The computer 22 is programmed for the establishment of cross machine size of the continuous sheet of paper, the positioning of the start of the gluing work, the establishment of the distance between the adjacent spot-glues, etc.

The operating arm 18 is provided with a cut-away groove 18a for holding a pin 23 provided on an upper portion of the body 7 and the upper portion of the body 7 is supported by the pin 23. The operating arm 18 extends from an operating member 26 loosely fitted to a shaft 24 carried on the framework 1 through a bush 25.

The operating member 26 is formed therein with a vertical hole and a pin hole perpendicular to the vertical hole and passing across the vertical hole. A pin 29 provided on arm 27a of mounting member 27 mounted on the shaft 24 is inserted in the pin hole, and a spring stored in the vertical hole and an adjusting screw 30 screwed therein from its end portion render a damping effect.

The operation of the gluing apparatus will now be described for the application of glue to one sheet of paper P. First, in order to automatically skip the cross machine, the information of the size of the cross machine perforation and skipping are programmed into the computer 22, the start position is adjusted, and then the switch is turned on. As a result, the main motor is driven and the rotation is transmitted to the pin wheel 2 and roller 3 to advance the continuous sheet of paper P.

At the same time, the encoder 5 is actuated by the gear 6 meshed with the gear 4 formed on the roller 3 to detect the advancing movement of the sheet of paper P and generate a pulse signal in response thereto. The servo motor 20 is driven by this signal and a pulse signal by a counter signal input in the program to rotate the gear pump and discharge glue from the nozzle 14 mounted on the body 7 which is applied onto the continuous sheet of paper P.

When a nozzle separation pulse is actuated by the pulse signal of the encoder 5 and the pulse signal of the program counter, the servo motor 20 is rotated reversely for establishing the amount of the skip

dimension and is rotated normally immediately before it passes the skip establishment dimension to discharge the glue from the nozzle 14. That is, a normal rotation and an instant reverse rotation are effected by the pulse signal of the encoder 5 and the pulse signal coming from the program counter in order to skip the cross machine by the amount of the established length.

The sheet of paper P coated with glue is then collated with the other sheets of paper Pa, Pb, Pc similarly coated with glue by the associated gear pump body 7.

Next, in order to perform a spot gluing, the distance between the adjacent spot gluing is programmed in the computer and the motor is rotated normally and reversely in turn by the pulse signal of the encoder and the signal of the program counter according to the programmed data input, so as to spottedly apply the glue onto the continuous sheet of paper P. The gear pumps similarly apply glue to the other sheets of paper Pa, Pb, Pc and the sheets are collated.

Figure 4 illustrates part of the collator incorporating another embodiment of the gluing apparatus. A roller 103 having a pin wheel 102 is mounted in a framework 101 of the collator and is driven by a main motor to advance a continuous sheet of paper P guided by guide rollers and hung over the roller 103 and meshing with the pin wheel 102.

A gear pump body 107 is located opposite the continuous sheet of paper P and contains therein gears meshed with each other and acting as a rotor. The body 107 is formed therein with a chamber to which one end of a hose 116 connected with a glue reservoir 115 is connected.

The body 107 is formed at its lower portion with a forward extension 107a in the direction of the nozzle 114 provided on the body 107. The lower surface of the extension 107a is formed with a cut-away groove 107b for engaging with a rotary shaft 117 stretched across the framework 101 and driven by the main motor. The body 107 is supported on the rotary shaft 117 and an operating arm 118 as described later herein.

The rotary shaft 117 is provided with a gear 119 for meshing with a gear 113 mounted on a rotor shaft disposed within the body 107 so that the rotation of the rotary shaft 117 is transmitted to the gear within the body 107. That is, a pumping effect is produced.

The body 107 is provided at its upper portion with a pin 123 in the transverse direction. Further, on this upper portion, the operating arm 118 extending from an operating member 126 is loosely fitted to a shaft 124 stretched across and carried by the framework 101 through a bush. The pin 123 is fitted into a cut-away groove 118a formed in the clamping portion of the operating arm 118, thereby to support the body 107.

The operating member 126 is formed therein with a vertical hole. The operating member 126 is also formed therein with a pin hole in the direction across the vertical hole. An arm 127a from a mounting member 127 mounted on the shaft 124 is provided at its foremost end with a pin 129, and the pin 129 is inserted into the pin hole. A spring stored in the

vertical hole and an adjusting screw 130 screwed therein from its end portion render a damping effect.

The shaft 124 is provided with an operating piece 132 mounted on its one end and actuated by a cam plate 131 for mechanically swinging the body 107 between an operative position shown in full lines in which a nozzle 114 mounted on the outlet side of the body 107 is alongside the sheet of paper P to an inoperative position shown in broken lines in which the nozzle 114 is separated from the sheet of paper P.

The operating piece 132 is provided with a tension spring 133 so that it is abutted against the cam plate 131. As a result, the shaft 124 is rotated by the cam plate 131 through the operating piece 132.

Accordingly, in the operative position of the body 107, the glue within the glue reservoir 115 is taken through the hose 116 into the body 107 due to the pumping effect and is discharged from the nozzle 114 and linearly applied onto the continuous sheet of paper P which is then collated with one or more sheets of continuous paper Pa similarly coated with glue by an associated gear pump body 107.

In order to spottedly apply the glue with a space between the adjacent glue coatings, the shaft 124 is swung by the cam plate 131 through the operating piece 132. As a result, the operating member 126 is swung through the arm 127a from the mounting member 127 mounted on the shaft 124, and the body 107 is swung about the rotary shaft 117 by the operating arm 118 thereby to approach or separate the nozzle 114 mounted on the body 107 to and from the continuous sheets of paper so that the glue can be coated thereon with a space between the adjacent glue coatings. With regard to the space, various coatings can be made by the cam plate 131.

As described in the foregoing, according to the first embodiment of the present invention, a gear pump body is driven by a servo motor controlled by a program counter signal input with size and data programmed in a computer and an encoder signal. The gear pump body is located opposite a continuous sheet of paper and is provided with a nozzle for applying glue onto the continuous sheet of paper hung over a roller having a pin wheel, and glue is discharged from the nozzle and is momentarily intaken according to the data input in the program for driving the body. As a result, a skip gluing or a spot gluing is effected according to the size of a cross machine. Therefore, the size adjustment, the discharge of glue and the stop of the discharge can be effected simply by means of operation of one button.

Further, the speed can be enhanced and work efficiency can be improved. Moreover, the continuous sheet of paper can be prevented from getting dirty with glue and glue can be saved.

In addition, when the gluing apparatus is mechanically actuated according to the second embodiment, the replacement of a cam as means for swinging the body permits a free selection of the skipping distance.

## Claims

1. A form collator gluing apparatus characterized in that a plurality of rollers (3;103) each having a pin wheel (2;102) are arranged in a framework (1;101), a sheet of paper (P,Pa,Pb,Pc) guided by a guide roller is hung over said pin wheel (2;102) and roller (3;103), said sheet of paper (P,Pa,Pb,Pc) hung over said pin wheel (2;102) and roller (3;103) is transferred by each roller (3;103) which is driven by a main motor, said sheet of paper is opposite a nozzle (14;114) mounted on an outlet side of a gear pump (7;107), an inlet side of said gear pump (7;107) is connected to a glue reservoir (15;115) through a hose (16;116), and by approaching or separating said nozzle (14;114) to or from said continuous sheet of paper (P,Pa,Pb,Pc), glue discharged from said nozzle (14;114) by said gear pump (7;107) is continuously or skipingly applied onto said continuous sheet of paper (P,Pa,Pb,Pc).

2. A form collator gluing apparatus as claimed in Claim 1 characterised in that said gear pump (7) provided with a nozzle (14) opposite the continuous sheet of paper (P,Pa,Pb,Pc) is driven by an encoder (5) for detecting said continuous sheet of paper (P,Pa,Pb,Pc) and a motor (20) connected to a computer (22) containing a program.

3. A form collator gluing apparatus as claimed in Claim 1 characterised in that said gear pump (107) provided with a nozzle (114) opposite the continuous sheet of paper (P,Pa,Pb,Pc) is swung by suitable swinging means such as a cam (131), and glue discharged from said nozzle (114) is linearly or skipingly applied onto the continuous sheet of paper (P,Pa,Pb,Pc) by approaching or separating said nozzle (114) of said gear pump (107) to or from said continuous sheet of paper (P,Pa,Pb,Pc).

4. In or for a form collator, gluing apparatus for applying glue to a continuous sheet of paper (P,Pa,Pb,Pc) characterised in that the apparatus comprises a gear pump (7;107) having an inlet (12) connected to a glue reservoir (15;115) and an outlet (11) provided with a nozzle (14;114) opposite the sheet of paper (P,Pa,Pb,Pc).

5. Gluing apparatus according to Claim 4 characterised in that the gear pump (7) is driven by a motor (20) under the control of programmable control means, for example a computer (22), in response to advancing movement of the sheet of paper (P,Pa,Pb,Pc).

6. Gluing apparatus according to Claim 5 characterised in that an encoder (5) is arranged to detect advancing movement of the paper (P,Pa,Pb,Pc) and generate a pulse signal in response thereto and the programmable control means (22) has a counter for counting the



pulse signals from the encoder (5) and generating a pulse signal to control operation of the motor (20).

7. Gluing apparatus according to Claim 5 or Claim 6 characterised in that the programmable control means (22) is operable to reverse the motor (20) on stopping discharge of glue.

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8. Gluing apparatus according to Claim 4 characterised in that the gear pump (107) is movable towards and away from the sheet of paper (P) under the control of mechanical means (131) such as a cam (131).

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9. Gluing apparatus according to Claim 8 characterised in that the mechanical means (131) controls rotation of a shaft (124) for swinging the gear pump (107) towards and away from the sheet of paper (P).

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10. A form collator comprising a framework (1;101), a plurality of rollers (3;103) spaced apart lengthwise of the framework (1;101), a main motor for driving the rollers (3;103), each roller (3;103) having a pin wheel (2;102) for advancing a sheet of paper (P;Pa;Pb;Pc) hung over the associated roller (3;103) and gluing apparatus (7;107) for applying glue to each sheet of paper (P;Pa;Pb;Pc) characterised in that the gluing apparatus (7;107) comprises a gear pump (7;107) having an inlet (12) connected to a glue reservoir (15;115) and an outlet (11) provided with a nozzle (14;114) opposite the sheet of paper (P;Pa;Pb;Pc).

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FIG. 1.

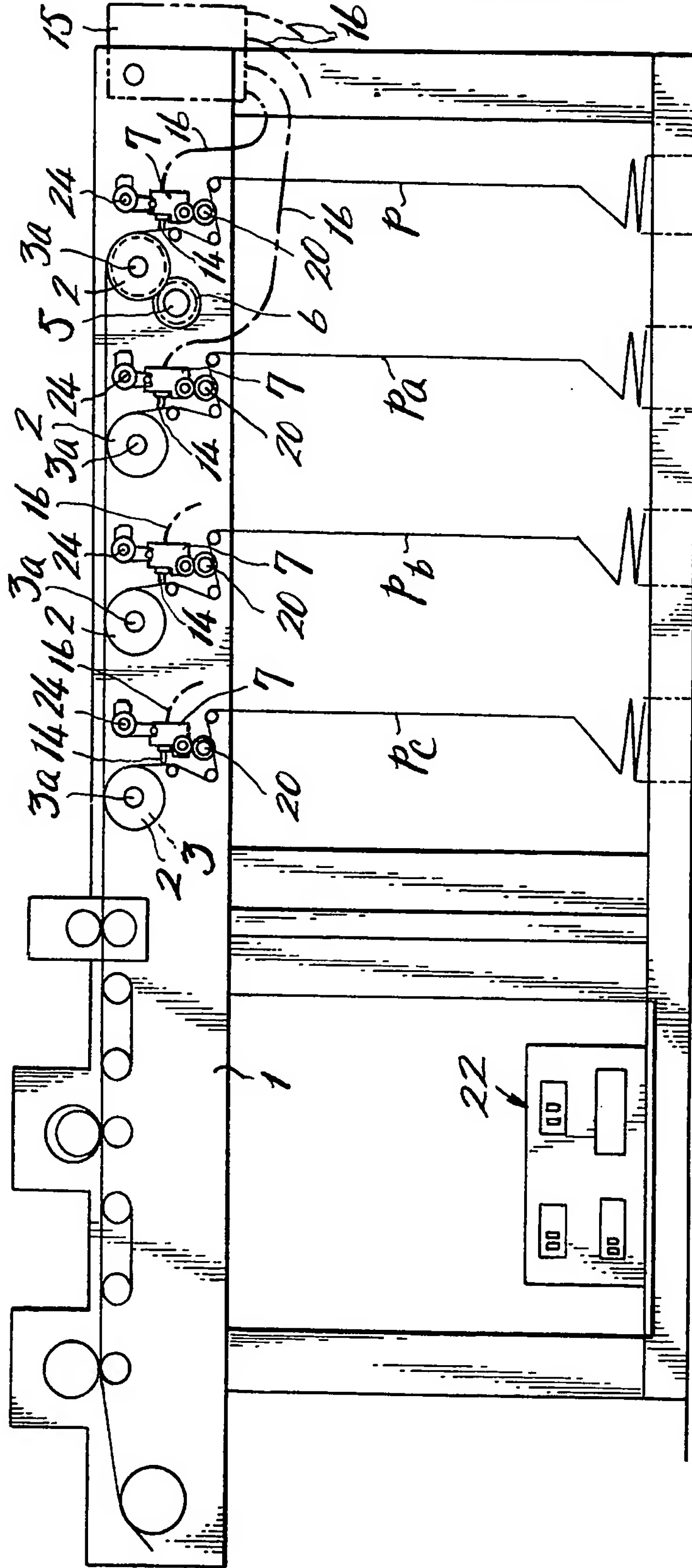
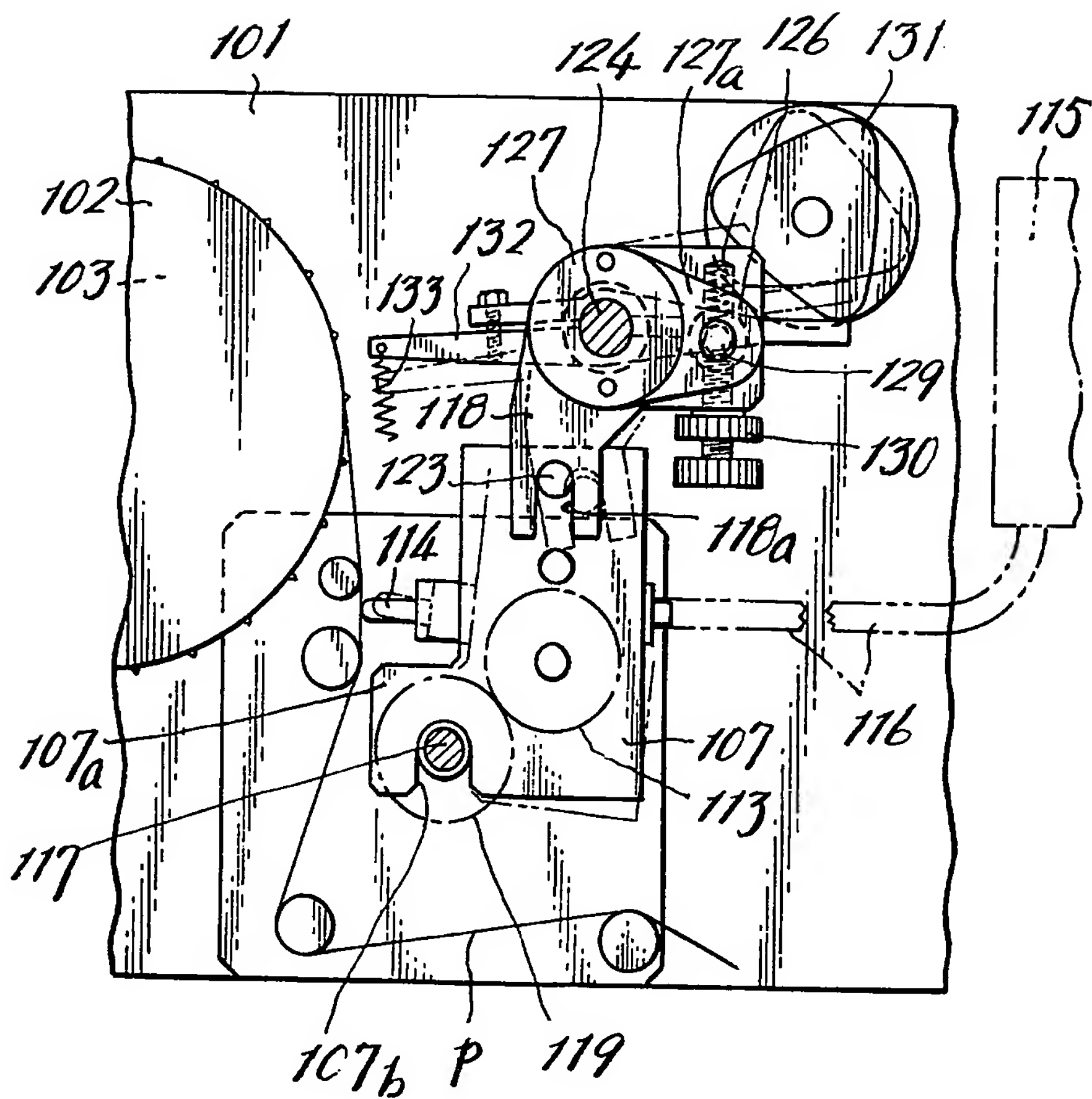




FIG. 4.







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## EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 88304576.7												
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)												
Y	DE - A1 - 3 220 629 (EHRET & FERRONI) * Claims; fig. * --	1-8	B 42 C 9/00 B 05 C 5/02												
Y	DE - A1 - 3 438 258 (GRAPHA-HOLDING AG) * Abstract; fig. 1 * --	1-8													
A	DE - A - 2 034 804 (HARRIS-INTER-TYPE CORP.) * Fig. 2 * --	1-8													
A	EP - A1 - 0 045 819 (AUTOMATION FUR GRAFISCHE TECHNIK AG) * Claims * --	1-10													
A	US - A - 3 682 468 (SCHRIBER) * Totality * ----	1													
The present search report has been drawn up for all claims															
Place of search VIENNA		Date of completion of the search 12-08-1988	Examiner SCHÜTZ												
<table border="0"><tr><td><b>CATEGORY OF CITED DOCUMENTS</b></td><td><b>T : theory or principle underlying the invention</b></td></tr><tr><td>X particularly relevant if taken alone</td><td>E : earlier patent document, but published on, or after the filing date</td></tr><tr><td>Y particularly relevant if combined with another document of the same category</td><td>O : document cited in the application</td></tr><tr><td>A technological background</td><td>L : document cited for other reasons</td></tr><tr><td>O non-written disclosure</td><td></td></tr><tr><td>P intermediate document</td><td>&amp; : member of the same patent family, corresponding document</td></tr></table>				<b>CATEGORY OF CITED DOCUMENTS</b>	<b>T : theory or principle underlying the invention</b>	X particularly relevant if taken alone	E : earlier patent document, but published on, or after the filing date	Y particularly relevant if combined with another document of the same category	O : document cited in the application	A technological background	L : document cited for other reasons	O non-written disclosure		P intermediate document	& : member of the same patent family, corresponding document
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O non-written disclosure															
P intermediate document	& : member of the same patent family, corresponding document														